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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/568,496	02/16/2006	David Robinson	LSN-36-1957	1185

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EXAMINER	
BERHANE, YOSIEF H	

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2467	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/568,496	ROBINSON ET AL.	
	Examiner	**Art Unit**	
	YOSIEF BERHANE	2467	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 July 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-11 and 13-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-11 and 13-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. **Claims 2-11, 13-22** have been examined and are pending. **Claims 1 and 12** have been canceled.

2. ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

4. (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. **Claims 2-7, 13-16, 20-23** are rejected under 35 U.S.C. 103(a) as being unpatentable over Patent 7,020,501 to Elliot et al. (hereinafter Elliot) and Publication 20030204587 to Billhartz well as Publication 20030236866 to Light and Patent 5,115,433 to Baran et al. (hereinafter Baran).

6. **As per claim 20 and 22**, Elliot teaches an apparatus for collecting data from distributed mobile data sensors respectively associated with mobile data relay devices communicating with each other in an ad hoc mobile network whenever they happen to be within communication range of each other, said method comprising (Col. 3, lines 53-55, Elliot discloses a Sensor network which includes one or more distributed sensor nodes that may organize themselves into an ad-hoc network. Note, as Elliot discloses in fig. 2, Sensor nodes communicate with each other in a geographic area (claimed communication range)):

7. data collection means for collecting sensor data in buffer stores of each said mobile data relay device (fig. 4, box 435 and box 415, Elliot discloses a Sensor Unit and a Processing Unit. Further, as disclosed in Col. 5, lines 30-43, Sensor Units are used for detecting acoustics, motions, radar and the like. Also, Col. 5, lines 14-16, Elliot discloses that the Processing unit may perform all data processing functions for inputting, outputting and processing of data including data buffering and sensor node control functions);

8. where the received sensor data is stored in its buffer store for later similar transfer to yet another device (Fig. 4, Box 415, Elliot discloses a Processing unit used for data buffering and sensor node control functions. Note, as disclosed in Fig. 4, the Processing unit is coupled to Sensor units. Also, as disclosed in Fig. 3, as well as Col. 4, lines 64-67, Elliot discloses that sensor nodes relay all messages through other sensor nodes (claimed transfer to yet another device))

9. transmitter and receiver means (Fig. 4, box 405, Elliot discloses a transmitter/receiver);

10. Elliot does not disclose expressly status data generation means for generating a scalar status value in each said mobile data relay device based on current local status parameters including at least the amount of collected sensor data currently accumulated in its buffer store, and communicating respective said scalar status values between said mobile data relay devices that happen to be within communication range of each other

11. Billhartz discloses, in Fig. 6 as well as paragraph 0049, a mobile ad-hoc network including a plurality of mobile nodes that comprise a router and controller, Wherein, as disclosed in Fig. 7, box 56, as well as paragraph 0050, the controller of the mobile nodes includes a route metric info unit (claimed status data generation means) that generates a QoS route metric (claimed status value), where as disclosed in paragraph 0056, the QoS metrics includes available power, available bandwidth by the node, recent error rate, recent delay, and node queue size (claimed accumulation in buffer store). Note, as discloses further in paragraph 0056, available power/bandwidth, error rate, delay and node queue size are locally known. Moreover, Billhartz discloses, in paragraph 0055, querying other nodes within a range for information regarding at least one QoS metric, and processing the QoS metric information received (claimed communicating respective said scalar status value);

12. Billhartz and Elliot are analogous art because they are from similar fields of endeavor dealing specifically with communicating between mobile nodes in an ad-hoc network.

13. At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the system of Elliot by generating scalar status value in each mobile data relay device and communicating the scalar value between the mobile devices within range, as suggested by Billhartz.

14. The rationale to do so would have been to enhance the Quality-of-service (QoS) in mobile ad hoc networks by provide allowing mobile nodes to negotiate with each other to manage the resources required for QoS routes (Paragraph 0009, Billhartz).

15. Therefore it would have been obvious to combine Billhartz with Elliot for the benefit of enhancing QoS in a mobile ad-hoc network, to obtain the invention as specified in claim 22.

16. Although the combination of Elliot and Billhartz disclose a scalar status value (Paragraph 0050, Billhartz discloses a route metric info unit that generates a QoS route metric (claimed scalar status value)

17. The combination of Elliot and Billhartz do not disclose expressly: generating a scalar status value based on separation distance from other of said mobile data relay devices;

18. Light discloses, in Paragraph 0014, the locations of each of the plurality of wireless nodes may be calculated based on the distance information obtained from each of the wireless nodes in the network. Further, in Paragraph 0016, Light also discloses that each of the wireless nodes are capable of receiving, transmitting, and relaying distance information (claimed scalar status value based on separation distance) of any one of the wireless nodes, which may be utilized to calculate relative locations of each of the wireless nodes within the wireless network.

19. Light, Elliot and Billhartz are analogous art because they are from similar fields of endeavor dealing specifically with managing communications between a plurality of wireless mobile nodes in a network

20. At the time of the invention it would have been obvious to one of ordinary skills in the art to modify the combination of Elliot and Billhartz by communicating a separation distance between mobile nodes, as suggested by Light.

21. The rationale to do so would have been to enhance an efficient and low cost solution for establishing a sensor network by self-configuring sensor nodes based on location information (Paragraph 0021, Light)

22. Therefore it would have been obvious to combine Light with Elliot and Billhartz for the benefit of enhancing efficiency of establishing a sensor network, to obtain the invention as specified in claim 22.

23. Although the combination of Elliot, Billhartz and Light disclose storing sensor data in a buffer (Fig. 4, Box 415, Elliot discloses a Processing unit used for data buffering and sensor node control functions)

24. The combination of Elliot, Billhartz and Light do not disclose expressly: means for evaluating, at each said mobile data relay device, received scalar status values from other devices with respect to its own scalar status value and if said evaluation satisfies a predetermined condition for an identified one of the other devices, then transmitting at least part of its accumulated data to said identified other device.

25. Further, as Baran discloses, in Col. 3, lines 65-68, as well as Col. 4, lines 1-10, each node of the network, collects or is otherwise provided with information about the quality of communication between itself and its neighboring nodes within its communication range. When a data packet has been received at a node, it is routed further (claimed transmitting at least part of its accumulated data) through the network based on criteria (claimed predetermined condition), where the criteria includes distance (claimed scalar status value). Note, as disclosed in col. 8, lines 3-7, the forwarding of data to a next node is based on distance, thus, each node will evaluate the distance between itself and a neighboring node to determine the most optimal node to forward data to. Also note, as disclosed in Col. 9, lines 65-68, the distance information is computed based on received packet information. Also see Col. 3, lines 48-64 as well as col. 7 lines 11-22.

26. Elliot, Billhartz, Light and Baran are analogous art because they are from same field of endeavor dealing specifically with managing communication of mobile nodes in a network.

27. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify combination of Elliot, Billhartz and Light, to evaluating received information and forward accumulated data based on a predetermined condition, as suggested by Baran.

28. The suggestion/motivation for doing so would have been maximize power efficiency of mobile nodes when routing data packets on a network (Col. 3, lines 59-64, Baran)

29. Therefore, it would have been obvious to combine Baran with Elliot, Billhartz and Light for the benefit of maximizing power efficiency of mobile nodes when routing data packets, to obtain the invention as specified in claim 22.

30. **As per claim 2**, the combination of Elliot, Billhartz, Light, and Baran teach means for receiving payload data transmitted by other similar devices (Fig. 6, box 42, "transmitter/receiver", Billhartz).

31. **As per claim 3**, the combination of Elliot, Billhartz, Light, and Baran teach a data source (Paragraph 0034, Billhartz discloses a source node).

32. **As per claim** 4, the combination of Elliot, Billhartz, Light, and Baran teach wherein the selection means is arranged to only identify a suitable receiving device if the scalar status value meets one or more threshold criteria (Paragraph 0050, Billhartz discloses a route selection unit that selects a route to the destination node (claimed receiving device) based upon the QoS route metrics (claimed threshold criteria)).

33. **As per claim 5**, the combination of Elliot, Billhartz, Light, and Baran teach a threshold criterion is that the remaining battery power is at least sufficient to transmit all the data currently in the buffer (Paragraph 0066, Billhartz discloses that a node uses criteria for deciding whether to support a given flow request, for example, a node that is running low on battery power may not want to support a given traffic flow).

34. **As per claim 6**, the combination of Elliot, Billhartz, Light, and Baran teach having means for selecting a threshold criterion as a function of elapsed time from a predetermined start point (Paragraph 0050, Billhartz discloses a route selection unit that selects a route to the destination node based upon the QoS route metrics (claimed threshold criterion). Where, as disclosed in paragraph 0053, the QoS metric includes end-to-end delay (claimed elapsed time). Also see paragraph 0076).

35. **As per claim 7**, the combination of Elliot, Billhartz, Light, and Baran teach condition-monitoring means for monitoring expected lifetime of the device (Paragraph 0053, Billhartz discloses that a QoS metric may be based on available power.),

36. and adjusting the scalar status value accordingly (Paragraph 0058, Billhartz discloses that a node that finds itself forwarding many packets, whose battery is running out may advertise his routes and connectivity to certain other nodes with a tag that disallows all but the most important (high priority) packets).

37. **As per claim 13**, the combination of Elliot, Billhartz, Light, and Baran teach wherein data is only transmitted from a first device to a second device located in its forwarding direction if the scalar status value derived from the status data meets one or more predetermined threshold criteria (Paragraph 0058, Billhartz discloses that a node that finds itself forwarding many packets, whose battery is running out may advertise his routes and connectivity to certain other nodes with a tag that disallows all but the most important (high priority) packets).

38. **As per claim 14**, the combination of Elliot, Billhartz, Light, and Baran teach wherein a threshold criterion is that the remaining battery power is at least sufficient to transmit all the data currently in the buffer (Paragraph 0066, Billhartz discloses that a node uses criteria for deciding whether to support a given flow request, for example, a node that is running low on battery power may not want to support a given traffic flow).

39. **As per claim 15**, the combination of Elliot, Billhartz, Light, and Baran teach wherein the status data includes a measure of the expected lifetime of the device (Paragraph 0053, Billhartz discloses that a QoS metric may be based on available power.).

40. **As per claim 16**, the combination of Elliot, Billhartz, Light, and Baran teach wherein payload data is transmitted, by means of one or more of the wireless relay devices, to a target sink device defined by a predetermined scalar status value (Paragraph 0050, Billhartz discloses a route selection unit that selects a route to the destination node (claimed receiving device) based upon the QoS route metrics (claimed scalar status data)).

41. **As per claim 21 and 23**, the combination of Elliot, Billhartz, Light, and Baran teach wherein: at least one higher powered data sink station also communicates with said mobile data relay devices when they happen the happen to be within communication range (Col. 3, lines 44-49, Elliot discloses monitor points may operate as sinks for sensor measurements made at nearby sensor nodes. Also see fig. 2);

42. and said data sink station communicates (Col. 3, lines 31-37 Elliot discloses schedule messages containing sensor node transmit and receive scheduling data)

43. a scalar status value which, when received by a data relay device, will be evaluated (Billhartz discloses in Fig. 7, box 56, as well as paragraph 0050, the controller of the mobile nodes includes a route metric info unit (claimed status data generation means) that generates a QoS route metric (claimed status value))

44. so as to cause the data sink station to be identified as the recipient of accumulated sensor data from the buffer store of that data relay device (Col. 3, lines 31-41, Elliot discloses that a Monitor Point (claimed sink) may broadcast scheduling messages which that include identification data for a monitor point and the number of hops to reach each identified monitor point. The messages permit sensor nodes to determine a minimum hop path to a monitor point.).

45. **Claims 8** is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Elliot, Billhartz, Light, Baran as applied to claims 2-7, 13-16 and 20-23 above, and further in view of NPL document Non-Patent Literature, “Power-Aware Localized Routing in Wireless Networks” by Ivan et al (Hereinafter Ivan).

46. **As per claim 8**, the combination of Elliot, Billhartz, Light, and Baran do not expressly disclose: wherein the separation distance between devices is determined from the power required to make a transmission between them

47. the combination of Elliot, Billhartz, Light, and Baran do not disclose expressly: wherein the separation between devices is determined from the power required to make a transmission between them.

48. However Ivan discloses that if nodes can adjust their transmission power by knowing the location of their neighbors, then a power metric can be used that depends on distance between nodes. The distance between neighboring nodes can be estimated on the basis of incoming signal strengths. Section 1.1 titled "Minimize energy required per routing task".

49. Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combination of Elliot, Billhartz, Light, and Baran, by using power requirement as a metric for determining the distance between nodes as suggested by Ivan.

50. The rationale to do so would have been to minimize power/energy consumption of mobile devices in an ad-hoc network by obtaining a measuring criterion for routing data that.

51. **Claims 9-11, 17-19** are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Elliot, Billhartz, Light, and Baran as applied to claims 2-7, 13-16 and 20-23 above, and further in view of Patent 6,735,448 to Krishnamurthy et al (hereinafter Krishnamurthy)

52. **As per claim 9**, the combination of Elliot, Billhartz, Light, and Baran do not expressly disclose: means for determining the power that would be required to transmit payload data to an identified receiving device, and means for generating a scalar status value related to that power requirement.

53. However, in Col. 5, lines 19-27, Krishnamurthy discloses that each node in the wireless ad-hoc network is equipped with a squelch circuit wherein the squelch circuit requires that the received signal power be greater than a minimum power level, MinRecvPower. The value of MinRecvPower helps determine the power level at which a mobile node has to transmit in order to directly reach a neighboring node.

54. Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combination of Elliot, Billhartz, Light, and Baran, by using power requirement as a metric or link cost used for determining routing information as suggested by Krishnamurthy.

55. The rationale to do so would have been to improve the efficiency of an ad-hoc network while minimizing power consumption.

56. **As per claim 10**, the combination of Elliot, Billhartz, Light, Baran and Krishnamurthy teach wherein the identified receiving device on which the power determination is based on the device selected for transmission on a previous determination (Col. 5, lines 7-17, Krishnamurthy discloses that link costs are chosen to be the transmitted powers. Therefore, the objective is to route the packet from the source to the destination through the minimum power path. Note, since link costs are based on transmitted powers, the same receiving device may be selected more then once if it is determined that the same receiving device is to be used in order to achieve the minimum power path).

57. **As per claim 17**, the combination of Elliot, Billhartz, Light, Baran and Krishnamurthy teach wherein the power that would be required to transmit payload data to an identified receiving device is determined, and a scalar status value is generated related to that power requirement (Col. 5, lines 19-27, Krishnamurthy discloses that Each node in the wireless ad-hoc network is equipped with a squelch circuit wherein the squelch circuit requires that the received signal power be greater than a minimum power level, MinRecvPower. The value of MinRecvPower helps determine the power level at which a mobile node has to transmit in order to directly reach a neighboring node. Furthermore, in Col. 5, lines 7-17, Krishnamurthy discloses that link costs are chosen to be the transmitted powers.).

58. **As per claim 18**, the combination of Elliot, Billhartz, Light, Baran and Krishnamurthy teach wherein the identified receiving device on which the power determination is based is the device selected for transmission on a previous determination (Col. 5, lines 7-17, Krishnamurthy discloses that link costs are chosen to be the transmitted powers. Therefore, the objective is to route the packet from the source to the destination through the minimum power path. Note, since link costs are based on transmitted powers, the same receiving device may be selected more then once if it is determined that the same receiving device is to be used in order to achieve the minimum power path).

59. **As per claim 11 and 19**, the combination of Elliot, Billhartz, Light, Baran and Krishnamurthy teach wherein the scalar status value h is determined by the value (N+k) C/B (Fig. 7, box 56, as well as paragraph 0050 Billhartz discloses a route metric info unit that generates a QoS route metric)

60. where N=number of packets of data currently in the buffer (Paragraph 0053, Billhartz discloses that the QoS route metric may be based on node queue size)

61. B=battery level (Paragraph 0053, Billhartz discloses that the QoS route metric may be based on available power)

62. C=power requirement of forwarding to the identified receiving device. k is a constant (Col. 5, lines 19-27, Krishnamurthy discloses that Each node in the wireless ad-hoc network is equipped with a squelch circuit wherein the squelch circuit requires that the received signal power be greater than a minimum power level, MinRecvPower. The value of MinRecvPower helps determine the power level at which a mobile node has to transmit in order to directly reach a neighboring node.).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yosief Berhane whose telephone number is (571) 270-7164. The examiner can normally be reached at 9:00-6:00 Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pankaj Kumar can be reached at (571) 272-3011. The fax phone number for the organization where this application or proceeding is assigned is. 571-273-8300

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/YOSIEF BERHANE/

Examiner, Art Unit 2419

/Pankaj Kumar/

Supervisory Patent Examiner, Art Unit 2467